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BEFORE THE
Federal Communications Commission
WASHINGTON, D.C.

FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

In the Matter of)
)
Telecommunications Relay Services) CC Docket 98-67
and Speech-to-Speech Services for)
Individuals with Hearing and)
Speech Disabilities)

COMMENTS OF THE
CELLULAR TELECOMMUNICATIONS INDUSTRY ASSOCIATION

The Cellular Telecommunications Industry Association
("CTIA")¹ respectfully submits these Comments to the Commission's
Notice of Proposed Rulemaking in the above-captioned proceeding.'

Introduction

CTIA has urged the Commission to promote and encourage the
development of new and innovative technology that will benefit
persons with hearing and speech disabilities, particularly those
who use text telephones ("TTYs") and telecommunications relay

¹ CTIA is the international organization of the wireless
communications industry for both wireless carriers and
manufacturers. Membership in the association covers all
Commercial Mobile Radio Service ("CMRS") providers, and includes
forty-eight of the fifty largest cellular and broadband PCS
providers. CTIA represents more broadband PCS carriers and more
cellular carriers than any other trade association.

² See In the Matter of Telecommunications Relay Services and
Speech-to-Speech Services for Individuals with Hearing and Speech
Disabilities, Notice of Proposed Rulemaking, CC Docket No. 98-67,
FCC 98-90, (released May 20, 1998) ("NPRM").

services ("TRS"). Specifically, CTIA has recommended that the Commission initiate a separate proceeding to address the development of enhanced protocols, such as the V.18 protocol standard, to improve interconnectivity between TTYs and digital wireless handsets.' While the Commission acknowledges that these issues "have considerable merit", the Commission subsequently minimizes their importance by stating that it "may address the issues in the future in a future proceeding."⁴

CTIA respectfully disagrees with the Commission's reluctance to address the issue of enhanced protocols at this time, particularly when evidence indicates that such protocols have the very real potential not only to improve interconnectivity between TTYs and digital wireless handsets but also to improve TRS calls. Moreover, awaiting the possibility of a future rulemaking can only serve to delay the development and implementation of such protocols in the United States.

CTIA strongly recommends that the Commission use this rulemaking proceeding to review the most current information on

³ See In the Matter of Telecommunications Relay Services, the American with Disabilities Act of 1990, and the Telecommunications Act of 1996, CC Docket No. 90-571, Comments of the Cellular Telecommunications Industry Association (filed March 17, 1997), Reply Comments of the Cellular Telecommunications Industry Association (filed April 21, 1997).

⁴ NPRM at 35, ¶79 (emphasis added).

the V.18 protocol standard, particularly in the context of TRS as well as interconnectivity between TTYs and digital wireless systems. Specifically, the Commission should revise its TRS technical requirements so that they encourage the development and implementation of new protocol standards to improve TRS as well as TTY interconnectivity with digital devices.

I. The V.18 Protocol Standard May Be Well-Suited for TRS Calls.

The Wireless TTY Forum⁵ has reviewed the V.18 protocol standard as a possible solution to address TTY interconnectivity with digital wireless handsets. In its recent Quarterly Status Report to the Commission, the Forum indicated that research and testing of the V.18 protocol standard are further along than the

⁵ The Wireless TTY Forum includes representatives from the four interest groups that have a significant stake in providing TTY users access to 9-1-1 over digital wireless systems: wireless telecommunications industry (wireless carriers and handset manufacturers), manufacturers of TTY equipment, emergency and relay service providers (9-1-1 and TRS), and consumer organizations that represent individuals who are deaf and individuals with hearing disabilities ("Stakeholders"). The purpose of the Wireless TTY Forum is to seek and develop technical solutions to support TTY technology over digital wireless systems for access to 9-1-1. The Wireless TTY Forum strives for consensus among the Stakeholders regarding the most appropriate technical solutions for providing TTY access to 9-1-1 over digital wireless systems. The TTY Forum commenced in September 1997 and has met regularly to continue its efforts to provide viable solutions for TTY access to 9-1-1 over digital wireless systems.

Forum had initially assumed, particularly in the European community.⁶

Mr. George Skorkowski of DSPG, LTD in the United Kingdom presented a status report on European efforts implementing the V.18 protocol standard. In his review of DSPG, LTD's implementation efforts, he specifically noted that the **V.18 protocol standard is ideally suited for TRS calls.**⁷

DSPG, LTD's implementation of the V.18 protocol standard includes prototypes such as the D-Tel 600 and D-Rel 100. The D-Tel 600 is a PC-based V.18 modem card for the operation of relay service. The D-Rel 100 is relay service equipment that connects via a cable to the D-Tel 600 and allows TRS operators to communicate with both deaf and hearing customers with voice-over capability.*

⁶ See In the Matter of Revision of the Commission's Rules To Ensure Compatibility with Enhanced 911 Emergency Calling Systems, CC Docket No. 94-102, Wireless TTY Forum: Seeking Solutions to TTY Through Wireless Digital Systems, Quarterly Status Report, 1 (filed July 10, 1998) ("July 1998 Quarterly Status Report"). Attached hereto as Appendix A.

⁷ See July 1998 Quarterly Status Report at 4 (emphasis added).

⁸ DSPG, Ltd. is implementing the V.18 protocol standard on two or three different platforms and forecasts that products will be available by the end of 1998. Mr. Skorkowski noted that an abstract of a new text telephone would be available in Europe by the end of the summer 1998. This device will include an open port that will allow additional flexibility in the future. See July 1998 Quarterly Status Report at 3-4. See also Contribution on V.18 Standard presented by George Skorkowski, Wireless TTY Forum 5 (May 21, 1998). Attached hereto as Appendix B.

In view of Congress' directive to the Commission that it should ensure that persons with hearing and speech difficulties benefit from technological advances,⁹ the Commission has a duty to review the data indicating that the V.18 protocol standard may be a viable way to improve TRS calls. Anything less contravenes the goals of the American with Disabilities Act of 1990.¹⁰

II. The ITU Recognizes the Importance of Enhanced Protocols As A Way to Improve Accessibility to Telecommunications for Persons with Hearing or Speech Disabilities.

The International Telecommunication Union ("ITU"), the international standards-setting body, states that the V.18 protocol standard "is intended for use in text telephone, in interworking units, in text relay services, in emergency centers, and in computers to be used for text telephony in the PSTN."¹¹ The ITU acknowledges that its work on the V.18, the T.134 and the T.140 protocol standards,¹² represent

⁹ See 47 U.S.C. § 225(d)(2)(1996). See also H.R. REP. NO. 101-485(II), 101st Cong., 2d Sess. 130 (1990).

¹⁰ The American with Disabilities Act of 1990, Pub.L. No. 101-336, § 401, 104 Stat. 327, 336-69 (1990).

¹¹ International Telecommunication Union, Telecommunication Standardization Sector, Revised ITU-T Recommendation V.18 (Feb. 1998), 1, [http://www.pi.se/~omnitor/standd.htm\(V18-COM 16-46CORR-clean.doc\)](http://www.pi.se/~omnitor/standd.htm(V18-COM 16-46CORR-clean.doc)) (emphasis added).

¹² Recommendation T.140 "defines a universal presentation-level protocol for text conversion which will work with all multimedia protocols and with [V.18....Recommendation T.134 is a companion to Recommendation T.140 and defines a simple data protocol for

a great step forward for users who suffer from hearing- or speech-related problems. These people who in the past have suffered from a fragmented market of incompatible text telephony systems, will benefit greatly from having global standards on which future systems can be based.¹³

In addition to European and ITU's efforts, Gallaudet University plans to test a prototype device with the V.18 protocol standard to determine its reliability and usability with TTYs manufactured in the United States.¹⁴

The Commission should not preclude information on the most recent efforts on standards-setting and testing the V.18 protocol standard from the record. CTIA urges the Commission's Office of Engineering and Technology to be actively involved in reviewing the data and opining on the technical feasibility of enhanced protocols, such as the V.18 protocol standard, to improve TRS calls and TTY interconnectivity with digital devices.

test conversion in a data conferencing environment." Hearing and Speech Impaired to Benefit from New Standards, Report from ITU News (Oct. 1997) presented by Ken Wells, Philips Consumer Communications, Wireless TTY Forum 5 (May 21, 1998). Attached hereto as Appendix C. See also ITU-T Q9/16 Accessibility Standards Group, Documents from the ITU-T SG16 meeting in Geneva Jan. 26 to Feb. 6, 1998, related to Q9/16, <http://www.pi.se/-omnitor/standd.htm> (T134decided-clean.doc) (T.140decided-clean.doc).

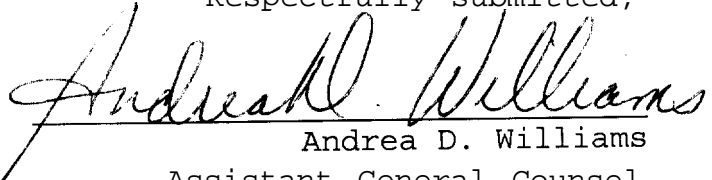
¹³ Id.

¹⁴ July 1998 Quarterly Status Report at 4.

Conclusion

For the reasons set forth above, CTIA respectfully requests that the Commission use this proceeding to review the most recent information concerning enhanced protocols, such as the V.18 protocol standard, to reflect the development of new technologies to ensure reliable TRS communications

Respectfully submitted,


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July 20, 1998

APPENDIX A

WIRELESS TTY FORUM

***Seeking Solutions to TTY Through Wireless
Digital Systems***

QUARTERLY STATUS REPORT

Submitted by:

**The Cellular Telecommunications Industry Association (CTIA)
Consumer Action Network (CAN)
Gallaudet University
National Association of the Deaf (NAD)
Personal Communications Industry Association (PCIA)
Telecommunications for the Deaf, Inc. (TDI)**

July 10, 1998

Introduction

The Wireless E911/TTY Forum-5 convened on May 21-22, 1998, in Washington, D.C. to continue its efforts to provide viable solutions for TTY access to 9-1-1 over digital wireless systems.¹ While the Forum adopted a consensus statement concerning carriers' and manufacturers' obligations by October 1, 1998,² the varied test results of the Throughput Test and a significant breakthrough isolating one source of the problem for one digital technology suggest that further research needs to be conducted in order to find technically feasible solutions. Hence, compliance by October 1, 1998 for some digital technologies may be technically impossible. One manufacturer, however, has presented potential solutions for GSM technology and stated that it will have a short-term solution via acoustic coupling available by October 1, 1998. Meanwhile, the Forum plans to continue pursuing research efforts for the other digital technologies, and develop a technical information document for those companies that plan to use pursue an intermediate solution via direct connection with a 2.5 mm jack.

While the Forum meeting primarily focused on short-term solutions, there was discussion concerning efforts with respect to long term solutions. A presentation on the V.18 modem protocol standard indicated that research is further along than the Forum had initially assumed, particularly in the European community. The Forum is also in the process of drafting a standards requirement document (SRD) for circuit switched data. Other presentations provided potential solutions for analog phones.

Finally, the Forum anticipates that the next phase of testing, *i.e.*, benchmark/validation tests, will commence during third quarter 1998. The consumer advocacy groups plan to formalize a set of user requirement document to more explicitly define their needs and requirements for accessing 9-1-1 with TTYs over digital wireless systems. This document may be contributed during TTY Forum 6, which is scheduled for July 21-22, 1998 in Washington, D.C.

¹ The TTY Forum Meetings were held on the following dates: September 17-19, 1997; December 11-12, 1997; February 11-12, 1998; April 1-2, 1998; and May 20-21, 1998. Subsequent meetings are scheduled for July 21-22, 1998, and September --, 1998, in Washington, DC.

² There was a consensus to accept the following statement: carriers who can offer TTY users at least one digital phone model at a reasonable price by October 1, 1998, would be considered in compliance of the FCC's E9-1-1/TTY compatibility requirements. It was also acknowledged that manufacturers have a separate obligation under Section 255 of the Telecommunications Act of 1996 to ensure that their equipment is accessible or compatible with TTYs.

I. TEST RESULTS OF THROUGHPUT TEST

The combined Working Group #1/#3 has developed an objective test procedure that is designed to evaluate the "throughput" error rate of 45.45 baud Baudot TTY devices over wireless telephone links ("Throughput Test"). The purpose of the Throughput Test is to provide manufacturers with a standard test that will provide a reliable measure of error rate in transmission over an air interface. Character error is the dependent variable in this test. Most manufacturers used the real life test pattern provided to the TTY Forum as Contribution TTY/98.02.11.10 and added scenario-based modifications. The TTY Forum reached a consensus at the February 1998 Forum Meeting that phone manufacturers would use the Throughput Test to benchmark TTY signal performance over digital capabilities in order to determine the success rate for transport.

Preliminary test results showed variations in the percentage of character error rate for different digital technologies. For CDMA technology, tests revealed a character error rate from 6% to 16%. For TDMA technology, test results revealed a character error rate from 2% to greater than 10%, and for GSM technology, 2% to 4% character error rate. The percentages varied depending upon a number of variables such as test conditions (laboratory vs. actual network), vocoder rate, fixed location vs. mobile, performance of TTY equipment, etc. See test reports of several manufacturers attached hereto as Appendix A.

A. CDMA Technology

Lucent Technology reported a significant breakthrough with respect to identifying one major source of the problem of passing the Baudot signal over CDMA digital technology. Specifically, the problem is not the vocoder as engineers had initially suspected, rather preliminary test results indicate that the problem is more closely related to the CDMA frame error rate (FER) which is inherent to CDMA technology. Test results indicate that the frame error rate is a dominant factor contributing to the character error rate, *i. e.*, 1 percent FER is approximately 9 percent character error rate, with normal operation translating anywhere between 8% to 16% character error rate. Nokia reported its test results on CDMA and concluded that the vocoder rate also has a major effect on the character error rate. Motorola provided preliminary test results for CDMA and postulated that the character error rate is based on the type of echo cancellor. Test results from Sprint PCS indicate that power is also an issue.

While the manufacturers postulated on possible future solutions, it was confirmed that they are still in the process of defining the problem and must still isolate other variables that contribute to significant character errors in transmission before they can move to the next phase of their research, *i. e.*, field testing. There was discussion that several possible solutions presented may require significant changes in a carrier's network architecture, particularly trying to control the vocoder rate and frame error rate. Several Forum members indicated that trying to control the frame error rate is more complex and will require further research than anticipated by the Forum. They also noted that such changes could very well result in reducing capacity, which is the antithesis of deploying digital technology. Several members of the TTY Forum expressed concern as to whether such changes to network architecture are realistic, particularly when researchers have yet to isolate all the factors contributing to the character error rate and in view

of the October 1, 1998 compliance date less than five months away.

B. GSM Technology

At the Forum, Ericsson outlined its short-term, intermediate and long-term solution for GSM technology. Ericsson indicated that it is pursuing acoustic handset coupling as a short-term solution and plans to have its solution available by the October 1, 1998 compliance date. Ericsson's test results indicate a character error rate of 1% for GSM, and 6% with TDMA with respect to acoustic coupling. Ericsson's intermediate solution is direct electrical connection using a standardized connector, and long-term solution is direct coupling to the TTY. Ericsson's representative explained that transmission through the TTY and wireless network will eventually run digital but will have to convert back to analog for POTS transmission. With respect to a direct electrical connection, Ericsson advocated standardization of the connector.

C. TDMA Technology

Since the May 1998 Forum Meeting, Philips Consumer Communications (Philips) has conducted the Throughput Test using its *Aeon* cellular phone (TDMA) with the Lober & Walsh Mobility TTY Device on a live network. Its test results indicated a 2% to 5% character error rate *when operating from a fixed location*. While these results look promising, Philips also concluded that additional tests are needed to assess performance with other TTY equipment and whether loss of character synchronization can be improved by delaying the rate at which characters are sent by using "half rate" transmission. See Philips Aeon TTY Interoperability Test Report attached hereto as Appendix A. See also Nokia's TDMA measurements in its report, TTY/TDD Compatibility Measurements (Preliminary Results), attached hereto in Appendix A.

II. TECHNICAL INFORMATION DOCUMENT

Ericsson submitted a draft document with information and findings to formulate a Standards Request Document for those companies that wish to pursue an interim solution of direct electrical connection via 2.5 mm jack. While Ericsson recommended submission for standardization, the Forum acknowledged that the standards process could take from 18 to 24 months to complete. There was consensus that the document be developed as a technical information document from the TTY Forum. Forum members also agreed that the document will be for information purposes only to provide guidance to those manufacturers that wish to pursue direct connection via 2.5 mm jack as an interim solution. The Technical Information Document is not intended as an exclusive solution or requirement. An ad hoc working group was formed to prepare a final draft for the next TTY Forum Meeting scheduled in July 1998.

III. LONG TERM SOLUTIONS

A. V.18 Standard

Mr. George Skorkowski of DSPG, Ltd. in the United Kingdom provided the Forum with a status report on European efforts using the V.18 standard. Mr. Skorkowski noted that in Europe there is a significant problem with interoperability of various text telephones due to the lack of standards for such devices. V.18 is an attempt to standardize the system and allow TTYs with different protocols communicate with one another. Essentially, the V.18 standard translates the TTY signals by allowing the devices to detect which protocol (Baudot, ASCII, etc.) is being

used. DSPG, Ltd. has done extensive testing with Ultratec and European models of TTYs and indicates that the TTYs must be adapted from a two wire to a four wire device.

DSPG, Ltd. is implementing the V.18 standard on two or three different platforms and indicates that products will be available by the end of the year. The concept of a new text telephone will be available in Europe by the end of the summer. This device will include an open port that will allow additional flexibility in the future. Mr. Skorkowski noted that the V.18 standard is ideally suited for TRS calls. See Contribution on V. 18 Standard attached hereto at Appendix B. See also Excerpt from ITU News dated October 1997 attached hereto as Appendix C.

While European efforts on the V.18 standard are promising, Gallaudet University is testing a prototype device with the V.18 standard to determine its reliability and usability with TTYs manufactured in the United States.

While the Forum to date has primarily focused on short term solutions to meet the imminent October 1st compliance date, it was acknowledged that the Forum has not spent enough time on long term solutions. An issue was raised as to whether the Forum needs to revisit its consensus statement concerning retrofitting for Baudot and focus resources on long term solutions such as advanced text messaging that provides real-time, two-way communication.

B. Standard Request Document – Circuit Switched Data

Working Group #2 provided a draft Standards Request Document (SRD) for Circuit Switched Data (CSD) and Inter-Working Function (IWF). CSD is a service that complements the existing suite of wireless voice and data services including telephone interconnect, short message service and packet data. CSD enables subscribers to directly connect a laptop or facsimile device to their multi-service portable for remote wireless modem and fax data communications to wireline data services. The IWF platform contains the hardware and software elements required to facilitate CSD service through each carrier's mobile switching center. The purpose of the SRD is to define the requirements for CSD and IWF. It is envisioned that CSD will be integrated onto wireless platforms and combined with packet data and short message services to meet the communication needs of the deaf and hard-of-hearing. See Systems Requirement Document for Circuit Switched Data attached hereto as Appendix D.

Working Group #2 recommended that the TTY Forum submit the SRD to a standards body. Forum members will provide written comments on the draft SRD at TTY Forum 6 in July 1998.

IV. BENCHMARK/VALIDATION TEST

Forum members agreed that an enduser test is not the best process to arrive at valid results. Judy Harkins explained that an enduser test is too subjective and manufacturers need a benchmark to target. She indicated that identifying where communications breaks down might not describe the acceptable error rate for a TTY user in an emergency. An ad hoc working group was established to develop an objective benchmark/validation test to present at the July 1998 Forum Meeting. This group will be responsible for the completion of the benchmark/validation test. It is anticipated that testing will commence during third quarter 1998..

V. OTHER ISSUES

A. Status of Consumer Notification

Carriers continue their efforts notifying subscribers and potential subscribers that they may not be able to access 9-1-1 with a TTY over a digital wireless system. The TTY Forum also will send a copy of the consumer notification text to the FCC, the Access Board and other appropriate Federal agencies to use in any manner they feel would expedite getting the information to consumers, *i. e.*, website, fax-on-demand. With respect to the issue concerning manufacturers' reluctance to include the notification text in the packaging, manufacturers indicated that the reluctance was based on business reasons. They view the notification document as a living document that will change periodically while the phones "on the shelf" may not. There is concern that customers may receive a notification that is outdated if included inside the box or on the packaging. While the manufacturers noted that the obligation is upon the carrier to notify subscribers and potential subscribers, they will provide notification in forms they deemed appropriate to their business and marketing plans.

B. HCO/VCO Access to 9-1-1

At the May 1998 Forum Meeting, CTIA reported on guidance from the FCC's Wireless Telecommunications Bureau (Wireless Bureau) concerning HCO/VCO access to 9-1-1 over digital wireless systems. The Wireless Bureau stated that if carriers cannot technically provide HCO/VCO access to 9-1-1 over digital wireless systems by the October 1, 1998, compliance date, the parties should submit such information in writing to the Wireless Bureau. The documents should include a notification process whereby carriers will notify their subscribers in a timely manner that they cannot use HCO/VCO to access 9-1-1 over digital wireless systems. The Wireless Bureau also indicated that the Commission would expect the parties to provide a timetable as to when HCO/VCO access to 9-1-1 over digital wireless systems could be achieved from a technical standpoint. The Wireless Bureau also requested additional information on whether the PSAP community have the technical capability to accept HCO/VCO calls; whether analog phones can provide HCO/VCO access to 9-1-1; and statistical data regarding current and anticipated demand for HCO/VCO access to 9-1-1 over digital wireless systems.

In response to the FCC's guidance, the Forum has established an ad hoc working group to address HCO/VCO issues under long term solutions and to respond to the FCC's request for additional information. The ad hoc working group and Forum members representing PSAPs will provide information at TTY Forum 6 in July 1998.

C. User Requirement Document

In response to the Forum's request for a list of user requirements, the consumer groups presented a draft document outlining conditions that the industry must meet to provide the deaf and hard-of-hearing with access to 9-1-1 over digital wireless systems, particularly if the industry wants consumer support for the "one phone model" concept. See "User Requirements for One Phone Model Per Service Provider by October 1, 1998" attached hereto as Appendix E. Subsequently, the Forum members discussed having an opportunity to review and comment on the draft document. Forum members were requested to provide constructive feedback via e-mail by June 4, 1998. The consumer advocacy groups plan to formalize a set of user requirement document to explicitly define their needs and requirements for accessing 9-1-1 with TTYs over digital wireless systems. The TTY Forum anticipates that this document will be presented as a contribution at TTY Forum 6 in July 1998.

D. TTY Access to 9-1-1 Over Analog Wireless Systems

At the May 1998 Forum Meeting, several companies made presentations on accessing 9-1-1 over analog wireless systems via TTY. Lober and Walsh demonstrated its product, which is a modified TTY device compatible with an analog Motorola phone. It also provides HCO with a headset plugged into the TTY. Lober and Walsh also has been working on a solution for digital wireless phones and anticipates providing the TTY Forum a demonstration with digital wireless phones at the July 1998 meeting. Sendele Wireless Solutions also provided information on its AxCell product, an interface device that allows connection between the TTY device and an analog wireless phone. CTIA again requested information from manufacturers concerning their analog phones that are TTY compatible. CTIA is in the process of gathering this information in one central location for service providers and consumers.

VI. NEXT STEPS

- Assess progress of research in view of October 1, 1998 deadline and determine how to proceed.
- Review and amend TTY Forum Agreements, particularly in view of status of research and October 1, 1998 compliance date.
- Propose new agreement statement regarding carrier and manufacturer responsibilities after October 1, 1998.
- Finish compilation of analog phone and device list for distribution during third quarter 1998.
- Continue research to isolate the factors contributing to character error rate.
- Presentation and consideration of user requirements document at TTY Forum 6.
- Identify work effort on VCO/HCO access to 9-1-1.
- Review and publish Technical Information Document concerning 2.5mm jack.

- Review and prepare for submission SRD on Circuit Switch Data.
- Develop End User Benchmarking and Validation Process and conduct field testing during third quarter 1998.

APPENDIX B

**CONTRIBUTION
ON
V.18 STANDARD**

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May 21, 1998

D-Tel 100 Modem

A major advance in communications for the hard of hearing and profoundly deaf.

- ∞ Full implementation of V.18 standard
- ∞ Compatible with all existing textphones
- ∞ Display & storage of calls with separation of sent and received messages
- ∞ Supports simultaneous use of voice and text
- ∞ Constant telephone line monitor
- ∞ Digital answering machine features
- ∞ **Phonebook/organiser** database
- ∞ Standard and **customisable** automatic greetings

CC Autotext

- ∞ E-mail option
- ∞ Speech recognition option

Text telephones developed to date to enable hard of hearing and profoundly deaf users to communicate have used a **variety** of incompatible communications standards. For the **first** time with the **D-Tel 100** modem, a **Windows/DOS** PC user is able **to** communicate **with all existing** textphones. Designed using advanced digital signal processing technology with controlling Windows or DOS based user interface.

Full Implementation of **V18** standard

introduced to enable **automatic interworking** with the **variety** of existing text telephone standards

Compatible with existing textphones

Interworking tested with **textphones** using any **of the** following standards: Baudot 50; Baudot 45; EDT; **V21**; V23 and **DTMF**.

Digital answering machine features

Auto **answer** records date and time of calls received.
Records text messages & e-mail only limited by size of disk.
Enables call review: next call, last call. selection by date & time. fast **forward/reverse** word search
Option to customise outgoing voice messages.
Remote accessing of stored **messages** under password control.
Automatic scheduling of calls for example to take advantage of cheap overnight rates.

Supports Simultaneous Use of Voice and Text

Enables both parties to **make** full natural use of both voice and **text interactively** as required

Constant telephone line monitor

Operates in background while the computer is being used for other applications with a pop-up message box on ring detect **after a customisable** number of rings.

Call connection progress is displayed

Recognises and displays **PSTN** call **progress** tones.

Bar graph line quality monitor

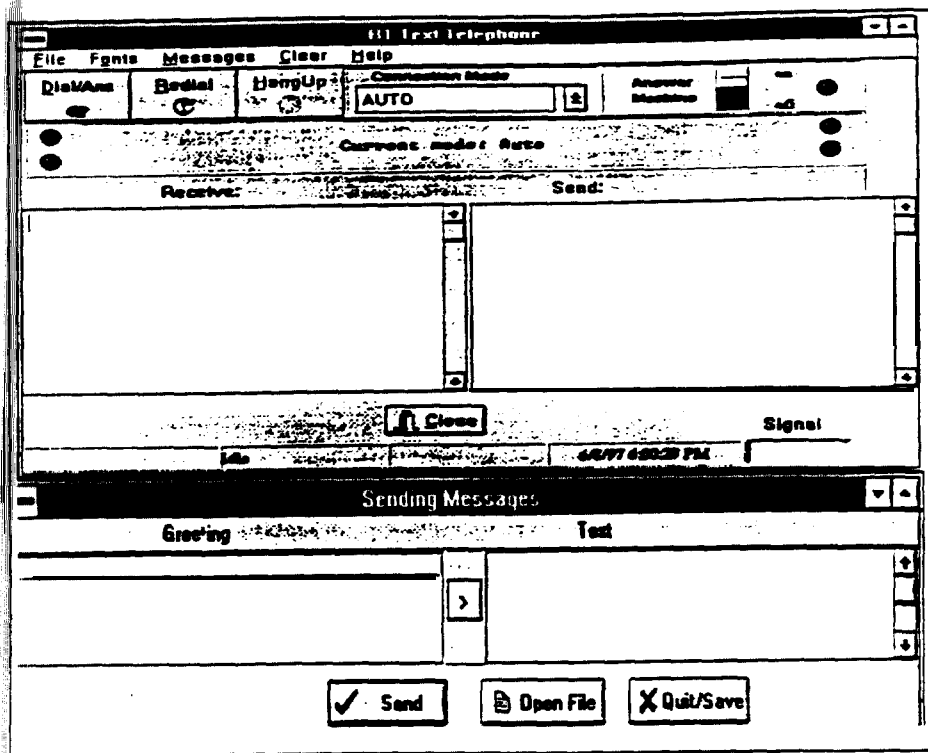
If the telephone line quality is poor you can check and advise the telephone company.

Choice of line interfaces

Connects to PSTN, GSM, PABX (via handset port) or acoustic coupler.

Speech recognition option

Optional state-of-the-art speech recognition **software** allows deaf users to input **text** verbally with a minimum of training.



Display & Storage of calls with separation of sent and received messages

Displayed for review or printing as separate scrollable windows maintaining the relationship between your messages and responses from the other party

Standard and customisable automatic greetings

Optional automatic 'hello' text message for textphone callers and outgoing voice messages for voice callers; customisable voice messages can be created using an attached telephone or via a soundblaster card

Autotext

Customisable store of frequent responses that can be used during calls to speed up conversation.

E-mail option

Messages can be pre-prepared and sent as an e-mail or used to reduce time on-line when making an interactive call.

Phonebook/organiser database

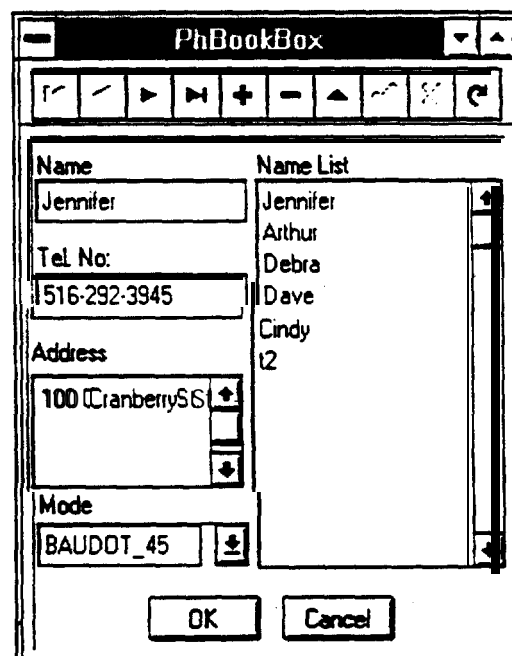
Store phone numbers, names, addresses, personal notes, key words for use in a search index to find a required phone number when, for example, only the service required is remembered. The type of modem or text telephone used is also stored and used with CL1 (Calling Line Identification) for automatic immediate adapting to the modem/textphone of the other party.

Full control of type and size of font

The type and size of font can be changed to suit your preferences.

Software automatically upgradeable from bulletin board

As systems develop it is possible to have your software automatically upgraded to add new features over the telephone line.



Contact:

DSPG Ltd.

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D-Tel 500 Textphone

The First Global Textphone

- ∞ Full implementation of V.18 standard
- ∞ Able to communicate with all existing textphones.
- ∞ Interfaces to the telephone line (PSTN)
- ∞ Display & storage of calls with separation of sent and received messages on a 2 line 40 character backlit liquid crystal display
- ∞ Approximately 18 hours battery or mains operation
- ∞ **128K** bytes non volatile memory provides ample capacity for storing important conversations and messages prepared off line
- ∞ Digital answering machine features
- ∞ E-mail option
- ∞ Phonebook
- ∞ 64 key keyboard with **10** customisable function keys
- ∞ Incoming call **signalling** system
- co Emergency alarm button
- ∞ Standard and customisable automatic greetings
- ∞ Automatic caller recognition in countries where **CLI** available
- ∞ **Autotext**
- ∞ Future-proofing by remote upgrade via telephone line

Text telephones developed to date have used a variety of incompatible communications standards. For the first time with the D-Tel 500 a user is able to communicate **automatically** with **all** existing textphones. Designed using advanced digital signal processing technology, it sets new standards of features, cost performance and reliability by which other textphones will be judged.

Full implementation of **V.18** standard

introduced to enable automatic inter-working with the variety of existing text telephone standards

Compatible with existing textphones

Automatic recognition defaults to unknown calling party textphone. **Interworking** tested with **textphones using** any of the following standards Baudot SO; Baudot **45**; EDT; **V21**, V23. DTMF.

Display & storage of calls **with** separation of sent and received messages on a 2 line 40 character backlit liquid crystal display

Another feature unique to the D-Tel range aids clarity and where **full** duplex communication is possible, for example when communicating with another D-Tel user, allows the same natural interaction that is available to those who **are** able to hear when using a **normal telephone**.

Supports simultaneous use of voice and text

Enables both parties to **make** full **natural** use of both voice and text interactively as required.

Mains or battery operation

For users on the move messages can be prepared off-line and sent when a phone line is available without a mains supply by using 4 internal standard **alkaline or rechargeable batteries that allow up to 18 hours use**.

128K bytes non-volatile memory

Provides a large capacity **for storing auto answered** text messages and **important** conversations

Phonebook

Stores **phone** numbers, names and the type of textphone used. The D-Tel **500** will automatically dial and adjust to the correct **type** of textphone when a name in the phonebook is selected.

Incoming call and emergency **signalling** system

As standard a call is **signalled** by a flashing light on the D-Tel 500

Digital answering machine features

Auto answer **after** a customisable number of rings.

If **caller line identification (CLI)** available the caller's phone no. will **be** recorded and if in the D-Tel 500 phone book. the caller's name will **be** recorded.

Records text messages **& e-mail** in non-volatile memory.

Enables **call review**: **next** call, **last** call. selection by date **&** time, fast **forward/reverse** word **search**.

Option to **customise** outgoing voice messages.

Emergency button

Automatic **dialling** and transmission of an **emergency** message can be carried out by simply pressing the **emergency** button on the **textphone**.

E-mail option

Enables off-line preparation of e-mail messages.

Able to **use the** INTERNET for e-mail via **the** DSPG Textphone Intmct Service.

Automatic caller recognition in countries where **CLI** available

If the caller's details **are** entered in the D-Tel 500a phone book. **the** D-Tel 500a **will** display the caller's name and **adapt** to the caller's textphone standard before the call is answered.

Standard and **customisable** automatic greetings

The standard 'hello' text for textphone callers can be customised

Autotext

A customisable store of frequent phrases is available for instant use by use of hot keys. to help **reduce** the time spent **keying**.

Call connection progress is displayed

Recognises and displays PSTN call progress tones.

Interfaces to the telephone line

Connects to PSM.

Remote upgrade via telephone line

As **new** features and additional options become available it will be possible to **upgrade** automatically **over the telephone line**

Deliverables

Textphone. Power supply, Training video. Operating manual

Contact:

DSPG Ltd.

DSP House

253a Kilburn Lane

LONDON **W10** 4BQ

Telephone: **(+44)** 8 **1964** 0774

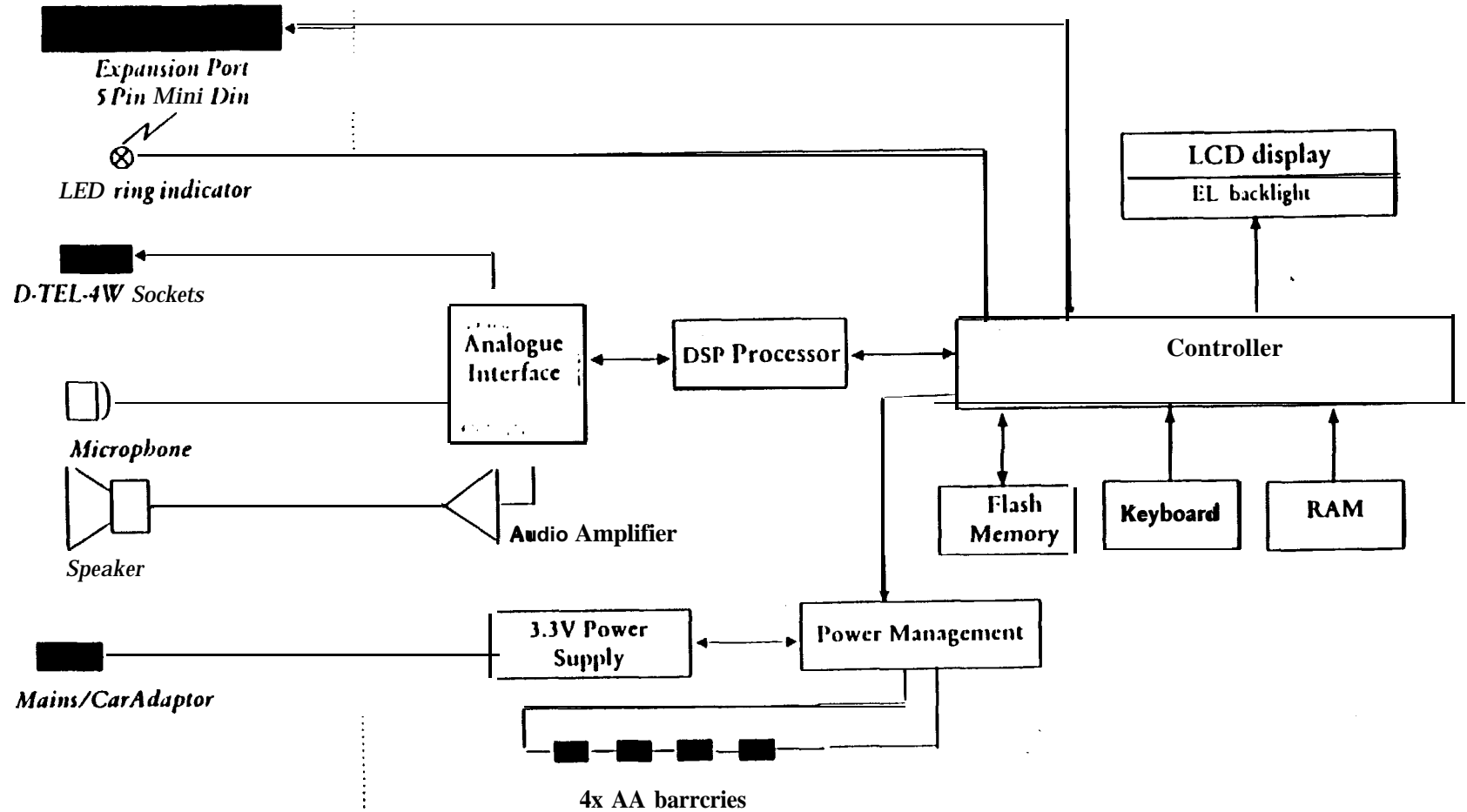
Facsimile: **(+44)** 81964 0720

E-mail: **enquiry@dspg.co.uk**

D-TEL500

Internal Block Diagram

User Interfaces



Text-Telephone Integration

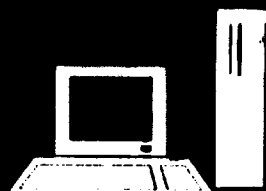
Page



Information
Service

Internet Mail
Service

Telephone
Network



Internet

Information
Gateway

Text to/from voice
Service

Products:

D-Tel 100: PC-based V.18 modem (at production stage). Connects to PSTN via various interfaces. The *D-Tel* range uses a **proprietary internal** protocol based on memory mapped registers.

D-Tel 101: PC-based V.18 modem with ISDN compatibility (near production stage).

D-Tel 150: PC-based V.18 modem with simultaneous voice capability (at prototype stage).

D-Tel 200: Stand-alone modem unit connecting to serial port of PC implementing the standard Hayes AT protocol (at design stage).

D-Tel 500: Stand-alone text telephone. Basic low-cost version (at prototype stage).

D-Tel 501: Stand-alone model with full features (at production stage).

D-Tel 600: PC-based V.18 modem card for operation of relay service. Powerful floating point processor allows future enhancement (at prototype stage).

D-Tel 100: Relay service equipment. Connects via 34-way cable to *D-Tel 600*. Allows operators to communicate with both deaf and hearing customers with voice-over capability (at prototype stage).

D-Tel 901: Payphone attachment for indoor use. Based on *D-Tel 500* telephone (at prototype stage).

D-Tel 902: Payphone attachment for outdoor use (at design stage).

V.18 Chip Set: DSPG are currently developing an IC chip version of V.18 modem implementation (presently undergoing extensive tests).

V.18 Test: During the development stage of the V.18 modem, BT Laboratories jointly with DSPG produced a sophisticated testing environment allowing quick assessment of V.18 performance. The current tester incorporates some of this work.

Accessories:

D-Tel PSTN 1: PSTN interface, based on commercially available line interface module XECOM (available as prototype only).

D-Tel PSTN 2: Optimised low-cost version of PSTN interface capable of operation with most networks (at prototype stage).

D-Tel PABX 1: PSTN interface to text telephone using any telephone with detachable handset as a line interface. Allows use of most telephone handsets as a microphone and speaker for voice-over.

D-Tel AC 1: Acoustic coupler for modems.

D-Tel GSM NK: Interface to Nokia GSM mobile phone.

D-Tel GSM EC: Interface to Ericsson GSM mobile phone.

Software:

D-Tel WTN: Windows 3.1 1/95 based software for all *D-Tel* 100 family modems.

D-Tel DOS: DOS based software for *D-Tel* 100 modems.

Services:

Internet/E-mail: Access to Internet /E-mail via DSPG Internet server.

Telephone Directory: Automated telephone directory service without **Minicom** operator.

Directory